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THE NEXT GENERATION NETWORK

CALL AGENTS, SOFTSWITCHES AND NETWORK INTELLIGENCE – THE OPEN SERVICES ENVIRONMENT OF TOMORROW

The ways in which the world communicates are undergoing radical change, thanks to a complex combination of technological, economic, political and social factors. This series of background briefings from Telcordia Technologies attempt to chart the impact of these changes on the networks and services that we use in our business and private lives. They hopefully show how we can smoothly evolve towards what the industry is calling the 'Next Generation Network' – common networks capable of handling data, voice and multimedia communications.

This issue brief focuses on one aspect of that evolution – the role and importance of an entirely new approach to creating and delivering telecommunications services across packet-based networks. Known as either Call Agents or Softswitches, this emerging technology is beginning to play a central role in the network strategies of both new and existing operators in both the fixed and mobile worlds. Without it, it will not be possible to achieve all the benefits of the new packet-based services and infrastructure and, as such, represents one of the most important developments in telecommunications

The situation – The central change underway in the world's networks involves an evolution towards packet-based technologies such as ATM and IP, instead of the familiar circuit-switched infrastructure of the public switched telephone network (PSTN). Packet-based networks provide considerable benefits in terms of both greater efficiencies and lower costs, as well as a means to deliver advanced and fully integrated voice, data and multimedia services.

This move towards a packet-based infrastructure, however, carries with it enormous implications for the whole of the industry.

The PSTN is currently based on a hierarchical infrastructure of switches that route the subscriber's call to its intended destination. Access to the PSTN is through a simple device – the telephone handset – compared to the processing power required to access the Internet. Each switch – the familiar telephone exchange – is effectively a powerful, highly complex, high-reliability real-time computer dedicated solely to handling call traffic. For a variety of reasons – some technological, some commercial, there is only a relatively small number of telecommunications manufacturers worldwide who have the capabilities to build PSTN switches and design the associated software. As a result, service providers have come to be limited in terms of the services that they offer to the software available from the switch manufacturers in mainly pre-packaged, modular forms. This makes it difficult for them to develop truly innovative services to differentiate themselves in increasingly crowded markets.

Intelligent Network (IN) technology, by separating the overall network intelligence that controls switch functions from the switches themselves, offers a way for service providers to gain a degree of independence in terms of developing new services. IN essentially acts as an overlay network to the existing switch infrastructure, making it easier for service providers to program and create new services as market conditions change. IN solutions are available from both the switch manufacturers, though these tend to be limited and tightly linked to that manufacturer's technology, or from manufacturer-independent organizations such as Telcordia. There is currently a resurgence of interest in IN as a result of both increased services competition but also the possibilities of easier interworking with the packet worlds that IN can deliver.

By contrast to both the above approaches, packet switching operates in a far more distributed way, with more intelligence at the edge of the network and far simpler switches at its heart. Having been originally designed to link computers – not humans – packet networks have not traditionally had the same high standards of service quality, availability, reliability, security and ease-of-use that we have come to expect from the PSTN. One of the most significant aspects of this concerns the ability of packet networks to transmit delay sensitive information such as voice or video in real time.

The idea behind the Next Generation Network is to bring these two worlds together onto a single infrastructure, where intelligence is distributed throughout the network. Distributed intelligence allows for a broad range of devices – from the familiar basic analogue telephones to smart appliances – to seamlessly co-exist, with the network providing the appropriate signaling and control functions for each type of unit and interface. As different services and applications are called into play by users, this distributed intelligence is able to work together in a collaborative fashion as appropriate. Instead of being a closed environment, totally under the control of the traditional telecommunications operators, the public network becomes a truly open platform over which new service providers and even third party developers can implement new applications.

There are many benefits to this approach. Applications and hence new services can be developed in a fraction of the time that it used to take incumbent operators and their switch suppliers. The elimination of their market dominance also opens up the market to a new breed of third-party applications developers, able to introduce innovation at a far faster rate then before, while bringing the benefits of an open market to increase competitiveness and lower prices.

This openness extends through to giving users the ability to self-provision advanced services as their own needs change, perhaps for example selecting different bandwidths or different levels of security. The growing ubiquity of the Internet – supported by the development of IPv6, technologies such as Bluetooth and the emergence of 'smart' interconnected domestic appliances – also carries with it the potential to act as a common medium for the exchange of all types of information.

Whatever the technology and service choices ahead of us, there are three interlinked 'hard' commercial benefits that Next Generation Networks offer the service provider community, effectively 'squaring the circle' of competitive pressures and threats.

Firstly, an open and flexible network environment makes it possible for operators to quickly introduce new services and hence grow their revenues. Secondly, the hardware costs will be much reduced, leading to major savings in capital expenditures – more bytes for the buck. Finally, the increasing automation and seamless integration of many back office support functions will mean a cut in day-to-day operating expenses.

The challenge – The key challenge facing today's telecommunications industry is to produce new network architectures and software that can deliver the same reliability and quality of service that we have come to expect from the traditional PSTN – but delivered over a packet-based, software

controlled, distributed network that will constantly be changing shape and function.

Take the many features of the PSTN that we have come to take for granted such as call forwarding, conferencing, Caller ID, emergency services, FreePhone and the like. How are these to be replicated in a packet network environment? Secondly, we will have the PSTN with us for many years yet, and therefore interworking between the two systems will be vital. Thirdly, operators have invested billions of dollars over the years in back office and billing systems and these must be integrated successfully.

To take an analogy from the world of biology: if the traditional telecommunications operator resembled a benign dinosaur, the new network model looks more like a sponge or slime mould – its constituent cells can be broken down into individuals which can then recombine to adapt to a new environment.

The key concept driving this new network world order is the idea of the Call Agent or Softswitch – terms that are still largely interchangeable. A Call Agent represents the intelligence of the circuit switch (e.g. Class 5 or 4 type) and depends often on IP/ATM gateways and Feature/Application Servers to deliver the full array of services. However, instead of being based on monolithic, expensive and dedicated resources, the Call Agent architecture uses standard industry processor platforms and open interfaces to create and deliver services across both packet and circuit switched domains.

Telcordia has played a leading role in the development of Call Agent concepts and currently has the most advanced Class 5 equivalent Softswitch in production today. Already deployed with operators in North America, the Call Agent provides a full range of call control functions for operators wanting to offer telephony or multimedia services over IP links using DSL, HFC or FWA in the public domain. These include features such as caller ID, call forwarding and voice mail as well as full support for regulatory requirements such as local Number portability and carrier pre-selection.

The solution – The Telcordia Call Agent is made up of five main functional components:

Call Processors – this communicates with the hubs, PBXs, packet switches, announcement servers and gateways via signaling messages, establishing and maintaining the state of calls in progress while also routing calls to and from the PSTN.

Subscriber Configuration Database – this provides storage for subscriber and network configuration information, including routing data to enable automatic least cost routing.

Call State Database – this maintains subscriber feature, call state and network state information for stable calls. It also contains the configuration data used during call processing in the Subscriber Configuration Database for faster access and least cost routing.

Management System – this provides the interface for configuration and provisioning of subscriber data and network elements. It also contains performance management data that measures traffic and component utilization to analyze network capacity.

SS7 Gateway – this provides an interface between the Call Agent and the SS7 network for 'Off-Net' outgoing calls or incoming ones from the PSTN. The SS7 network is also accessed for database lookups such as Local Number Portability, Toll-Free Calling and Caller Name functions.

Supporting the Call Agent are two additional Feature Servers:

Accounting Gateway – this primarily collects billing and usage data from gateways, gatekeeper devices and servers and then converts these into Call Detail Records (CDRs) that can be used in billing systems.

Announcement Server – this delivers the ability to play announcements to endpoints in a Voice over IP network.

The Future -One of the most important issues for service providers of all types in the

near future is being able to continue to interwork with existing legacy systems – both within their own networks or, in the case of the latest generation of fully packet-based new entrants, with the current PSTN. The Telcordia Call Agent has been designed to interact smoothly with standard Intelligent Network signaling interfaces, allowing seamless interworking with all the services that are currently supported on the PSTN. This ensures that historic network investment is protected and can be readily integrated with these new, more efficient network architectures.

Beyond providing support for existing systems, the Call Agent approach also begins to open up a wide range of possibilities for the development of services by third parties – including corporate customers, independent application developers and new types of service provider operating their own servers. Current work on standardizing Application Programming Interfaces (APIs) is well advanced in the industry and will help create a near 'plug and play' environment for service development and rollout.

This combination of third party service development, provision and operation will create a truly distributed and extremely powerful platform for all types of service across all classes of subscriber, leading to ever greater levels of customer choice and niche service provision and marketing. Services will effectively reside everywhere and will be accessible through a far greater variety of devices than is currently possible, using different interfaces and signaling as appropriate. In the medium to longer term, these possibilities will expand to include multimedia content, both real time as well as streamed data flows.

Telcordia, through its Call Agent portfolio and its involvement in most of the standards bodies involved in defining Next Generation Networks, will continue to play a major role in deciding the shape of telecommunications in the future.

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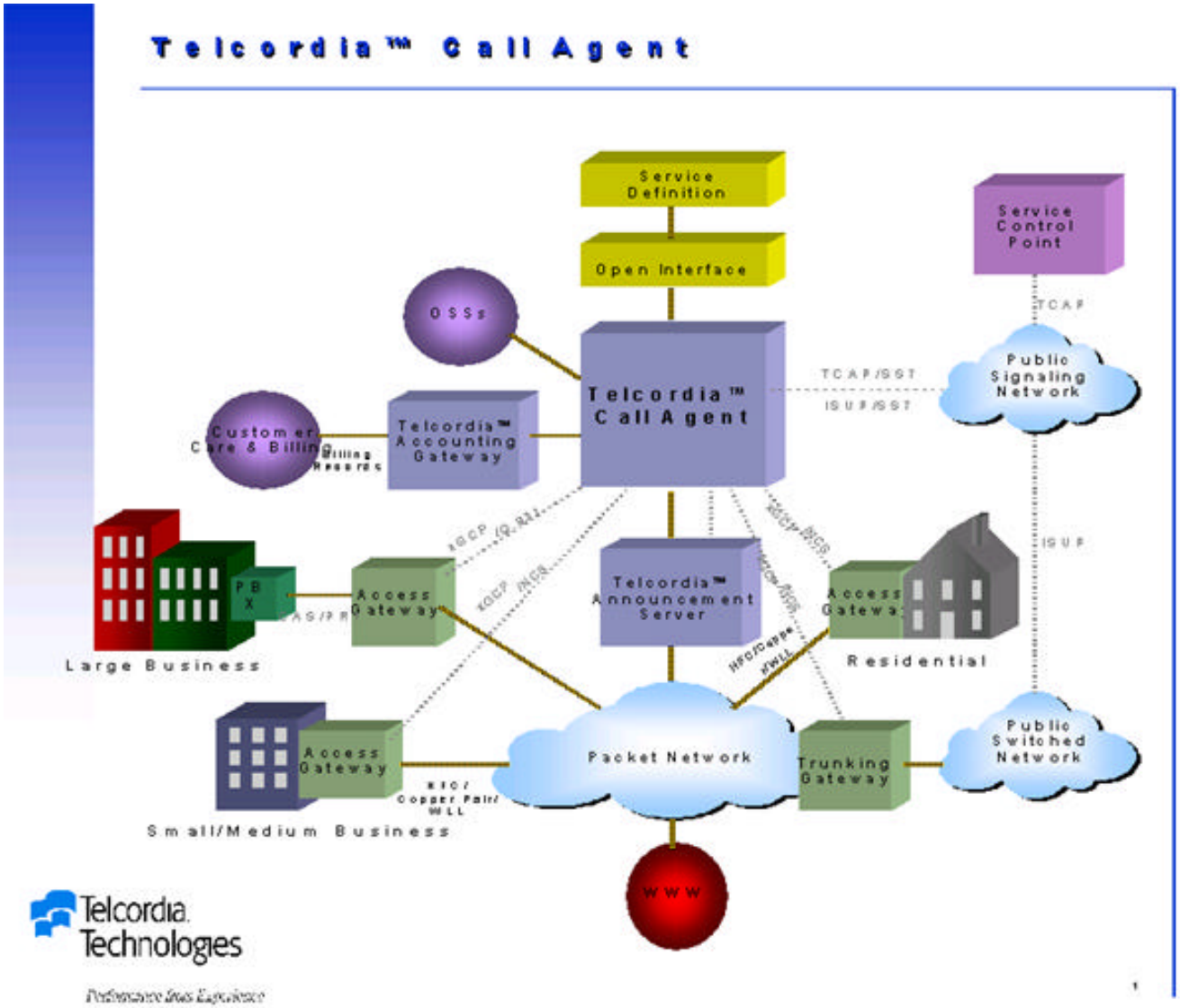
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